



LAT™-NL Series

Solar Charge Controller

5A/10A/15A/20A

User Manual

1. Description of Function

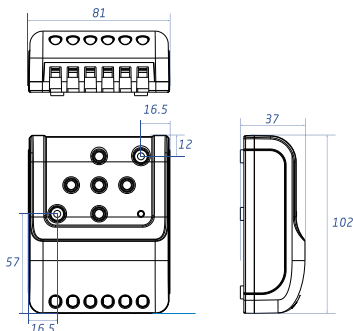
LAT-NL series intelligent solar controller is especially for solar photovoltaic power generation system and solar street light system.

It comes with a number of outstanding features, such as:

- Programmable nightlight function
- 12V/24V automatic recognition
- Clear readable display of charge/discharge and error description
- Four stages charge way: fast, boost, equal, float
- Temperature compensation
- Low voltage disconnected regulated by state of charge
- Max. 16mm² binding clamp
- Full automatic electronic protect function

This manual provides some important recommendations related to the controller, including installation, use, programming and fault exclusion.

2. Dimensions



3. Safety instructions and waiver of liability

3.1 Safety

①The solar charge controller may only be used in PV systems in accordance with this user manual and the specifications of other modules manufacturers. No energy source other than a solar generator may be connected to the solar charge controller.

②Batteries store a large amount of energy, never short circuit a battery under all circumstances. We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the battery wiring.

③Batteries can produce flammable gases. Avoid making sparks, using fire or any naked flame. Make sure that the battery room is ventilated.

④Avoid touching or short circuiting wires or terminals. Be aware that the voltages on special terminals or wires can be as much as twice the battery voltage. Use isolated tools, stand on dry ground, and keep your hands dry.

⑤Keep children away from batteries and the charge controller.

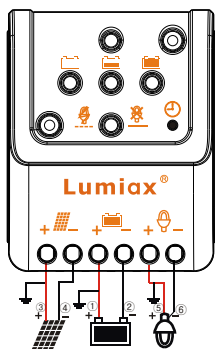
3.2 Liability Exclusion

The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

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4.Installation

The following diagrams provide an overview of the connections and the proper order.



- To avoid any voltage on the wires, first connect the wire to the controller, then to the battery, panel or load.
- Make sure the wire length between battery and controller is as short as possible.
- Recommended minimum wire size: Lat05-NL: 1.5 mm²; Lat10-NL: 2.5mm²; Lat15/20-NL: 4.0mm².
- Be aware that the positive terminal of controller are connected together and therefore have the same electrical potential. If any grounding is required, always do this on the positive wires.
- Connecting capacitive load may trigger short circuit protection.

Remark: If the device is used in a vehicle which has the battery negative on the chassis, loads connected to the controller must not have an electric connection to the car body, otherwise the Low Voltage disconnect and electronic fuse functions of the controller are short circuited.

5.Starting up the controller

5.1Self Test

As soon as the controller is supplied with battery, it starts a self test routine. Then the display changes to normal operation.

5.2System Voltage

The controller adjusts itself automatically to 12V or 24V system voltage. As soon as the battery voltage at the time of start-up is within 10V to 16V, the controller implies a 12V system, else if the battery voltage is within 20V to 30V, the controller implies a 24V system.

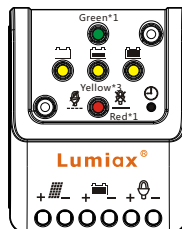
If the battery voltage is not within the normal operating range (ca. 10 to 16V or ca. 20 to 30V) at start-up, a status display according to the section **10.2 Error description** occur.

5.3Battery Type

The LAT series controller applies to Liquid and Gel battery, the factory default setting is suitable for liquid battery.

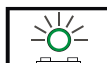
6.Display Functions

The controller is equipped with 5 LEDs.

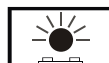


In normal operation, the controller shows charge or discharge status, battery capacity and load status.

6.1Charge display(Green LED) :



Solar array supplies electricity (LED is on)



Solar array does not supply electricity (LED is off)

6.2Status of charge display(Yellow LED):



< 25%



25-75%

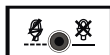


> 75%

The percentage corresponds to the available energy until low voltage disconnect in relation to a fully charged battery.

6.3Load status display(Red LED):

In case of deep discharge or overload/short-circuit of load, the load output is switched off.



Normal operation (LED is off)



Low voltage disconnect(LED is on)



Overload or short-circuit of load(LED is flashing)

7.Low Voltage Disconnect Function

The controller uses state of charge to protect the battery from being deeply discharged:

11.2V/22.4V~11.8V/23.6V.

Disconnect at 11.2V/22.4V(at nominal load current) up to 11.8V/23.6V(at no load current).

Note:

1. If the controller goes into low voltage protection, it will restore only when the battery being recharged and the voltage reaching the reconnect voltage.
2. Around oblique line value separately on behalf of 12V and 24V system's value.

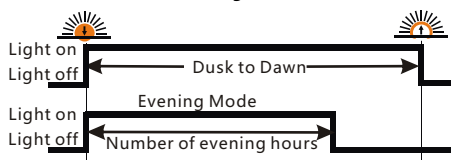
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8. Night light Function

The charge controller has a load terminal which is prepared for nightlight operation and switches on for a selectable number of hours from the dusk.

There are 2 modes available:

Dusk to Dawn and Evening Mode.



9. Programming Function

9.1 Programming Nightlight Function

You enter the programming mode with a long push on the button. The programming menu structure is described on the follow.

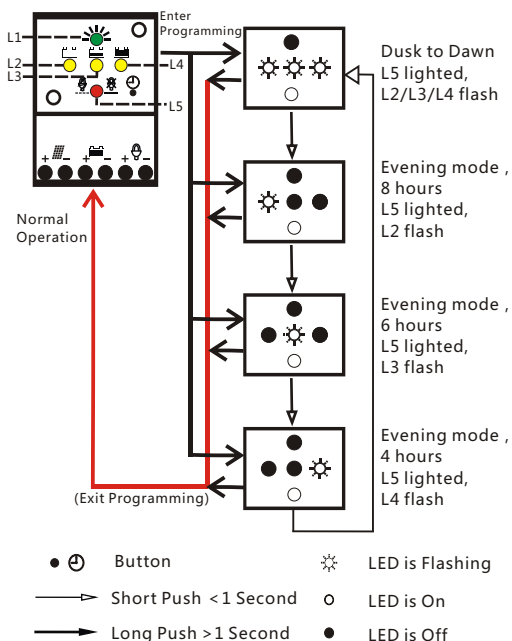
All programming settings are stored in a non-volatile memory and remain stored even if the controller was disconnected from the battery.

9.2 Test Function

During daytime the testing function can help the user to verify correct installation or for trouble shooting a system problem. Short pushing the button will light up the lamp which is connected to the load terminals.

The lights will be on in the day for 1 minute intervals. Within 1 minute the lights can be turned off via pushing button.

State of Charge Programming Menu



10. Safety Features and Error description

10.1 Safety features

	Solar terminal	Battery terminal	Load terminal
Reverse polarity	Protected *1	Protected *1	Protected *2
Short circuit	Protected	Protected *3	Switches off immediately
Over current	—	—	Switches off with delay
Reverse Current	Protected	—	—
Over voltage	Max.55V *4	Max. 40V	—
Under voltage	—	—	Switches off
Over temp.	switches off the load if the temperature reaches the set value.		

*1 Controller can not protect itself in a 24V system when polarity of battery or solar is reversed.

*2 Controller can protect itself, but loads might be damaged.

*3 Battery must be protected by fuse, or battery will be permanently damaged.

*4 The solar panel voltage should not exceed this limit for a long time as voltage protection is done by a varistor.



Warning: The combination of different error conditions may cause damage to the controller. Always remove the error before you continue connecting the controller.

10.2 Error description

Error	Display	Reason	Remedy
Loads are not supplied		Battery is low	Load will reconnect as soon as battery is recharged
		Over current/ short circuit of loads	Switch off all loads. Remove short circuit.
Battery is empty after a short time		Battery has low capacity	Change battery
Battery is not being charged during the day		Solar array faulty or wrong polarity	Remove faulty connection/ reverse polarity
over voltage protection		Battery voltage too high (> 15.5V/31V)	Check if other sources overcharge the battery. If not, controller is damaged.
		Battery wires or battery fuse damaged, battery has high resistance	Check battery wires, fuse and battery.
Does not recognize the system voltage		The battery voltage is not within the normal operating range at start-up	Charge or discharge the battery to make the voltage within the normal range

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11. Technical Data

Model	LAT05-NL	LAT10-NL	LAT15-NL	LAT20-NL
System voltage	12V/24V automatic recognition			
Max. solar current or load current	5A	10A	15A	20A
Fast voltage	14.0V/28.0V(25°C)			
Boost voltage	14.5V/29.0V (25°C)			
Equalization voltage	14.8V/29.6 V (25°C)(Liquid)			
Float voltage	13.7V/27.4 V (25°C)			
Load disconnect voltage	11.2~11.8V/22.4~23.6V			
Load reconnect voltage	12.5V/25.0V			
Working time during night	Dusk to Dawn mode, 4、 6、 8hours (Programmable)			
Battery type	Liquid、 Gel			
Temperature Compensation	-4.17 mV/K per cell(Boost, Equalization); -3.33 mV/K per cell(Float)			
Max. solar voltage	55V			
Max. battery voltage	40V			
Over voltage protection	15.5V/31.0V			
Dimensions/ Weight	81*102*37 / 150g			
Wire size	16mm²(AWG#6)			
Own consumption	4mA			
Ambient temperature	-40 ~ +60 °C			
Degree of protection	IP22			